REMARKS

Specification:

The examiner has stated that the title of the present invention is not descriptive. The amended title suggested by the examiner has been adopted.

Claim objections:

Claims 2 and 3 have been objected to because the term "mineral filler" has antecedent basis. The claims have been amended to replace the word "a" with "the".

Claim 11 has been objected to because the use of the term "the polymer" is incorrect because the composition only includes nylon and not any polymer. The claim has been amended to replace the term "polymer" with "nylon".

Claims 2, 3, and 11 are now believed to be in allowable condition.

35 U.S.C. §112, second paragraph rejections:

Claims 9 and 17 have been rejected under 35 U.S.C. §112 as being indefinite because the term "the inorganic filler" lacks antecedent basis. The claims have been amended to replace the term "inorganic" with "mineral".

Claim 10 has been rejected under 35 U.S.C. §112 as being indefinite because the claim is to a composition and thus cannot be an article. The claim has been amended to be drawn to an article rather than a composition.

Claim 14 has been rejected under 35 U.S.C. §112 as being indefinite because the plurals in the term "fatty acids, salts thereof, or a mixture thereof" are used to further limit the singular "saturated organic acid, salt thereof, or mixture thereof". The claim has been amended to recast the former phrase in the singular.

Claims 9, 10, 14, and 17 are believed to now be in allowable condition. Claim 16 is dependent on amended claim 14 and thus is also believed to be in allowable condition.

35 U.S.C. §103 Rejections:

Claims 1-17 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Metzemacher (US 5,827, 906) in view of Williams (GB 2 301 105) and Hyde (US 4,399,246).

The present invention is drawn to compositions comprising nylon 6, nylon 66, or a mixture thereof; a mineral filler having an aspect ratio of less than about 5 and an average equivalent spherical diameter in the range of about 0.1 to less than about 3.5 micrometers; and a saturated organic acid, salt thereof, or a mixture thereof.

The compositions of the present invention unexpectedly exhibit an increase in Izod impact resistance and/or and flexural modulus relative to the unmodified nylon, wherein the improved impact resistance and/or stiffness does not come at the expense of the other property, and wherein both properties may be simultaneously improved (see, for example, page 1, line 4 to page 2, line 6; and page 4, lines 8-17). This combination of properties is highly desirable for many nylon resin applications, but is often difficult to achieve.

Metzemacher discloses a "surface-modified filler composition [...] for flameproofing polymers" (col. 1, lines 6-7). No indication is given in Metzemacher that mineral fillers having the sizes and shapes presently claimed can provide such an improvement in toughness and/or stiffness of compositions of nylon 6, nylon 66, or mixtures thereof, or even that the filler composition disclosed therein has any impact on the physical properties of these nylons.

Williams discloses a molding composition containing a polyamide such as nylon 6 or nylon 66; an optional filler that acts as a flame retardant, such as magnesium hydroxide; and a surface defect reducing agent (abstract). No indication is given in Williams that these compositions have any improved physical properties, let alone those exhibited by the compositions of the present invention. Rather, Williams discloses compositions that "produce mouldings with reduced surface defects" (page 2, paragraph 4). These compositions may contain magnesium hydroxide, which can increase the flame retardance of the compositions.

Perhaps one skilled in the art wishing to prepare a flame-retardant composition might possibly look to the disclosures of Williams and Metzemacher. However, one wishing to develop nylon compositions having the unusual combination of stiffness and toughness properties of the compositions of the present invention would have no motivation at all to look

to the teachings of Williams and Metzemacher. Not only do neither of these references teach improved physical properties of the resulting compositions, but it is well known in the art of nylon molding compositions that the use of many additives, including flame retardants, can lead to compositions having decreased stiffness and/or toughness. Therefore, one skilled in the art would have no motivation to consult references directed to flame retardants when seeking a composition having improved toughness and stiffness properties.

Hyde teaches compositions derived from polyamide resin, a selected mineral filler, aminofunctional silane, and a selected sulfonamide. These compositions have improved falling weight impact resistance. However, the use of sulfonamides in conjunction with the aminofunctional silane is necessary to achieve this performance (see col. 3, lines 65-68 of Williams).

Hyde states that "the mean average particle size of the filler should be in the range of 0.2 to 2.0 micrometers (microns) to optimize impact resistance in the molded part. Examples of preferred minerals for use in the invention described herein are calcined clay (aluminum silicate), wollastonite (calcium silicate), and talc (magnesium silicate)" (see col. 3, lines 16-22). As is well known in the art, calcined clays and talcs typically used as fillers for polyamides are in platy forms that have aspect ratios that are significantly greater than 5, as presently claimed, and, similarly, typically used wollastonites are in a needle-like form that also have aspect ratios that are greater than 5. Thus, not only does Hyde not disclose the use of fillers having an aspect ratio of less than 5, but, in fact, teaches against them.

Furthermore, a comparison of Comparative Examples 2, 3, 6, and 7 with Examples 1 and 2 of the present application shows the advantage of the use of the mineral filler and saturated organic acid, salt thereof, or mixture thereof of the present invention relative to uncoated mineral fillers and mineral filler coated with aminofunctional silanes. Each of the examples and comparative examples uses nylon 6 filled with titanium dioxide. A comparison of Examples 1 and 2 (in which the filler has been coated with stearic acid) with Comparative Examples 2 and 3 (in which the filler has not been coated) illustrates that the use of the stearic acid coated mineral filler produces compositions having a substantially improved Izod impact resistance relative to the uncoated filler. Furthermore, a comparison of Examples 1 and 2 with Comparative Examples 6 and 7 (in which the filler has been coated with 3-aminopropyltriethoxysilane, an aminofunctional silane referenced in Hyde (see col. 3, lines 26-31, and particularly the reference to gamma aminopropyltriethoxysilane on lines 29-30)) demonstrates that the stearic acid coated mineral filler produces compositions having not

only greater notched Izod impact resistance than mineral filler coated with 3-aminopropyltriethoxysilane does, but that in the case of the saturated organic acid coating, the impact strength quite surprisingly increases with higher loadings of the filler, while when the aminofunctional silane coating is used, the impact strength decreases with higher loadings of the filler. Since higher filler loadings are often useful for increasing the stiffness of a composition, this difference can be of great utility.

Thus, as Hyde teaches that use of a mineral filler and a aminofunctional silane in combination with a selected sulfonamide improves the impact resistance of polyamide resins, and the use of the saturated organic acid, salt thereof, or mixture thereof of the present invention gives improved impact properties than aminofunctional silane, one skilled in the art would have had no ability to arrive at the present invention from the disclosure of Hyde.

Hyde teaches that improved falling weight impact resistance of polyamide resin compositions can be obtained by the use of a selected mineral filler and aminofunctional silane in combination with a selected sulfonamide and cites calcined clay, wollastonite, and talc, all of which are commonly used in polyamide resin compositions in platy or needle-like forms, as preferred mineral fillers. Metzemacher and Williams relate to mineral-filled compositions that are flame-retardant and/or have improved surface defects when molded. No indication is given that these compositions have improved physical properties. Therefore, one skilled in the art would have not only had no motivation to combine the teachings of Metzemacher with those of Williams and Hyde to arrive at the present invention, but would have been dissuaded from so doing by the disclosure of Hyde, which teaches away from the present invention.

Thus the claims 1-17 are believed non-obvious over Metzemacher in view of Williams and Hyde, and thus in allowable condition. Reconsideration and allowance are respectfully requested.

In view of the foregoing, allowance of the above-referenced application is respectfully requested.

Respectfully submitted,

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